Radial Fixture for Gear-cutting Operation. — The sight-bar and the other parts of the sight mechanism which are attached to it are elevated or lowered through a pinion which engages teeth cut on one side of the sight-bar. These teeth must be very accurately spaced; in fact, the total tolerance or allowable error in the fifty-five teeth of the sight-bar is only 0.0005 inch. The fixture used for milling these gear teeth is illustrated in Fig. 19. The gear teeth on the sight-bar do not form a rack, but rather the segment of a gear, since the pitch line is an arc; therefore, the radial type of fixture is employed. The base *A* is bolted to the machine table, and the swinging part *B* is pivoted at the rear end. Beneath this swinging part there is a segment of a worm-wheel, and meshing with it a worm carried by the shaft of the indexing mechanism. The indexing crank *C* connects with this worm-shaft through spur gearing. The sight-bar is clamped to an adapter plate, which is replaced by another adapter when the same fixture is used for milling operations on the yoke. The sight-bar is located in part by the finished surface of the head, as is the case in the other operations.

As it would be difficult, if not impossible, to construct a large fixture of this kind and eliminate all measurable error, the original inaccuracy is eliminated as far as possible in order to reduce the error in spacing the teeth to a minimum. The method of compensating for this original error is as follows: When indexing the fixture a distance equivalent to one tooth space, crank C is turned one revolution or until its spring-pin again comes around into mesh with the 'hole in the disk shown. Since there are 55 teeth in the sight-bar, and as the total original error was a few thousandths inch large, this error is compensated for by turning the indexing disk D backward an amount equivalent to -§V of the original error. There are really two indexing movements, therefore, for each tooth space, the same as in compound indexing. A gear tooth callper of the vernier type is used for testing the tooth thickness; the spacing is verified by placing pins between the gear teeth at each end of the segment, and also at intermediate points, and then measuring the distance between the pins by using a vernier caliper. The counterbalancing weights are also used in conjunction